JPRS-JST-86-008

3 APRIL 1986

Japan Report

SCIENCE AND TECHNOLOGY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-JST-86-008

3 April 1986

JAPAN REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

BIOTECHNOLOGY

PROMOTION AND PRESENT STATUS OF R&D REPORTED

Tokyo NORIN SUISANSHO KOHO in Japanese Apr 85 pp 10-15

[Article by Jajime Inouye: "Promotion and Present Status of Biotechnology"]

[Excerpts] The Ministry of Agriculture, Forestry and Fisheries established the National Institute of Agrobiological Resources in December 1983, and biotechnology section in the office of the Agriculture and Forestry Technology Committee. In this way, the ministry plans to promote research and development of biotechnology, and fiscal 1984 is considered the first year in the development of biotechnology. This article will explain briefly the promoting policy for biotechnology in terms of FY85 budget distribution in the Ministry of Agriculture, Forestry and Fisheries. In addition, it will explain the present status of technological developments in this field.

The Significance of Technical Development in Agriculture, Forestry, and Fisheries.

The biotechnology in the field of agriculture, forestry and fishery has focused on gene and the manipulation of chromosomes, cell fusion, nuclei transplantation, tissue culture and utilization of microorganisms and enzymes. By utilizing these technologies, breeding and mass production of agricultural plant, increase in domestic animals, mass production of vegetables, flowers and fruits as well as development of biological insecticides, improvement of food processing and utilization of unused natural resources will be researched. Especially, in the case of breeding of crop plant, breeding utilizing cell fusion has a great advantage over the ongoing crossing technology which has difficulty in seeding when the relationship of two types of seeds was remote due to so-called seed walls. In addition, by utilizing the frequent mutagenesis during tissue culture, the time required for the selection of good strains has been shortened. Although the total budget for the fiscal 1985 is 4.6 percent less than the preceding year, the budget for the development of biotechnology has been greatly increased from ¥1.278 billion to ¥1.96.

I. Reinforcement of Research and Development System

In order to promote biotechnology, administrators of genetic resources and microbial genetic resources were established in the Office of Agricultural, Forestry and Fisheries Technology Committee. Furthermore, the section of pre-

servation and administration of microorganism in the department of genetic resources in the National Instiutte of Agrobiological Resources, the section of seed and seedling technology research in the department of breeding in the Vegetable Experimental Station, section of microbial function technology research in the department of applied microbiology in the National Food Research Institute, and the section of cell technology research in the department of genetic resources in the National Institute of Agriculture will be established.

II. Promotion of Administration and Collection of Genetic Resources and Information on Breeding.

Genetic resources must be maintained in order to develop biotechnology. Recently, the genetic resources have been lost as the reduction of wildlife accompanied by the loss of tropical forests as well as the elimination of the old varieties caused by the spread of elite plants. The Ministry of Agriculture, Forestry and Fisheries has been preserved and administered about 100,000 types of agricultural genetic resources through the enterprise of "the establishment of general administration and utilization system of grain genetic resources and information on breeding." However the United States and Soviet Union preserve more than 300,000 types of genetic resources; therefore, the ministry decided to promote the enterprise to establish the gene bank of agriculture, forestry, and fishery products, and collect virtually all of the agricultural, forestry, and fishery biologicals including plants and microbials, nationwide as well as from abroad. The general administration and utilization system will be established to offer the data base including classification, identification, characterization, growth, and preservation of these genetic resources collected by governmental research institutes, private research institutions, and universities. This enterprise will be performed by active utilization of function and location of not only the research institutes, but also breeder's seed farms as well as breeding stations, through the organized cooperation among these facilities.

The objects of the gene bank for agriculture, forestry and fishery are listed below: (1) The promotion of research and introduction of useful genetic resources which offer useful phenotypes for the development of agricultural, forestry, and fishery industries as well as food industry will be pursued according to the annual plan established through council discussion for the agricultural, forestry and fishery genetic resources. The council is formed by scholars from test and research institutes, universities, and civilian enterprises. (2) In addition to the classification and identification of genetic resources researched and introduced, evaluation of physiological, ecological, biochemical, and genetic specificity will be conducted. In the case of wild species which could not be crossed with cultivated species, they will be improved to strains which can be crossed by utilizing embryo culture technique. As for microorganisms and fisheries, search and analysis of useful products released from and produced in them will be performed. (3) Through cooperation among facilities related each other, genetic resources will be stored for a long time and distributed. (4) The general data base administration system of classified genetic resources will be established through cooperation among the National Institute of Agrobiological Resources, the National Research Institute of Aquaculture and others. The information will be widely offered to industries and universities as well.

New facilities for the preservation of seeds and microbials and administration of information on the genetic breeding will be constructed in addition to the existing seed storage facility in the National Institute of Agrobiological Resources, resulting in the increase of storage capacity for seeds from 50,000 to 150,000 and 10,000 strains of microorganisms.

III. The Promotion of Research and Development

In order to develop biotechnology rapidly, the promotion of the fundamental biotechnology research project will be pursued in a long range prospective. The ongoing projects and new projects will be summarized as follows:

(1) The Development of New Biological Resources by Cell Fusion and Nuclei Transplantation.

New varieties, which cannot be obtained by the ordinary crossing technique, will be formed by cell fusion or nuclei transplantation between different strains. The replication of excellent varieties of cattle will also be pursued by the same procedures. At present, the breeding of potatoes, flowers, vegetables, forest trees, bacteria, and algae are in progress. The development of the procedures to prepare the diagnostic monoclonal antibodies for the domestic animal diseases is also in progress.

(2) The Clarification of Gene Manifestation Mechanisms in Agrobiologica Organisms.

For the development of the fundamental technology of recombinant DNA, a DNA library will be established. The desired DNA will be selected from the established library, and the structure will be analyzed. The development of integration technique from the selected DNA as well as the clarification of the mechanism of the expression of the DNA integrated into host cells will be pursued.

(3) The Clarification of Physiological and Genetic Structures of Photosynthesis and Respiration Function.

In order to improve plant photosynthesis activity dramatically, which might lead to the more efficient food production, the comparison between C3-type plants such as rice and barley, and C4-type plants like maize and sugar cane will be performed in terms of the efficiency of sunlight conversion and respiration function. In addition, by analyzing physiological and genetic mechanisms of photosynthesis and respiration, plants with efficient photosynthesis will be established.

(4) Development of New Technology To Utilize Microbials and Enzymes for Biomass Conversion.

Biomass resources could be converted efficiently to food, animal feed and energy by the functions of microorganisms and enzymes. Thus, the microorganisms and enzymes which have functions in biomass conversion will be researched and improved. The mass production procedure for microorganisms and enzymes as

well as the mass production and the immobilization technologies of enzymes will be established, which leads to the establishment of new technology in the applications of microorganisms and enzymes to biomass conversion.

(5) The Development of Breeding Technology of Fisheries by Gynogenesis.

For the purpose of the stabilization of fishery cultivation industry and supply of middle and high quality fishes, the new technology including production of only female fish which usually grow faster than male fish is to be researched. The neutralization of fish to produce large-sized fish will also be developed. The establishment of new breeding technology using chromosomal duplication will result in the establishment of technology for the introduction of new varieties and sex control, which will help the efficient production of fishes with dramatically improved quality.

(6) Research on Technology for the Long-term Preservation of Microbials.

The long-term storage technique of important microbials will be developed for agricultural, forestry, and fisheries industries as well as further food industry. In addition, genetic analyses of the microbials will be performed to improve quality.

(7) Research on Seeds Development in Biotechnology.

It is always necessary to cultivate seeds which precede the following steps of biotechnological developments: research on genetic regulatory mechanisms in agriculture, forestry, and fisheries; research on useful aspects of marine microorganisms; and studies on enzyme function for the development of artificial enzymes. They are fundamental and interdisciplinary studies which will be pursued under the cooperation among the national research institutes and other research institutes from a wide range of fields. In addition to the research plans listed above, the promotion of the development of biotechnology utilizing non-governmental research institutes is scheduled. As shown in the recent report made by OTA of the United States concerning the commercialization of biotechnology, it is easy in the field of biotechnology to apply the results of research to industry. Thus the cooperation among non-governmental research institutes for the application, development and industrialization of biotechnology will be promoted. In fiscal 1985, the development of technology listed below will be further promoted:

(i) Development of Bioreactor System in Food Industry

The development of bioreactor system integrated with biosensor by utilizing immobilized enzyme and microbials will be pursued in order to improve productivity and quality of hydrocarbons, protein, fat, and organic acid for the food industry.

(ii) Development of Common Fundamental Technology Such as Cell Cultivation in Order to Develop New Agrochemicals.

In order to develop biological agrochemicals which are environmentally safe for animals, very specific to the species of the insects, very effective with

small doses and originating from biological materials, three technologies will be developed. One of them is cell cultivation technology to produce effectively insect pheromone and antibiotics against plant pathogens, and the others are cell fusion and recombinant DNA technology for the improvement of biologically active materials of microorganism origin including antibiotics.

(iii) Development of Cell Fusion Technology To Improve Microorganisms and Plant Cell.

The conversion of microorganisms and plant cells into protoplasts, and their fusion and effective selection method of the obtained hybrid cells will be developed to establish cell fusion technology for microorganisms and plant cells which will lead to the improvement of the fermentation procedure, effective production of useful materials, and breeding new varieties of crop plants.

(iv) Development of Easy Diagnosis Process for Animal Diseases Utilizing Immuno-reaction.

Mass production and purification procedures of viral antigens and monoclonal antibodies will be developed to promote the utilization of enzymatic immunity assay system of animal diseases. In addition, these techniques will be applied to establish the diagnosis system.

(v) Development of Seeds and Seedlings Reproduction Procedure Utilizing Tissue Culture.

The procedures for the efficient production of excellent varieties utilizing tissue culture and mass culture of seeds and seedlings will be established in order to promote utilization of application of tissue culture technology to seeds and seedlings breeding and multiplication.

IV. Promotion of Strong Relationships Among Industry, Universities, and Governmental Administration.

Since biotechnology has a wide range of utilization, foreign countries have fortified the tie of multidisciplinary relationships among industry, universities and government in order to promote development and research of biotechnology. The Ministry of Agriculture, Forestry and Fisheries has also been promoting research and development through cooperation with industry and academic research institutes in addition to its own affiliated institutes. Other than the commission and fostering of study projects of industry and universities, the promotion of cooperation with industry and academic research institutes in addition to its own affiliated institutes. Other than the commission and fostering of study projects of industry and universities, the promotion of cooperation with industry, the acceptance of researchers to the national research institutes, the education by the Council for the Agricultural, Forestry and Fisheries as well as copying service of the research publications are in progress.

V. Promotion of Biotechnology in Local Areas

The potential for technical development is very high in the production of virus-free seedlings by tissue cultivation, and in the efficient breeding of domestic animals with excellent traits. On the other hand, development of local areas and expansion of new varieties causes the elimination of genetic resources including the special products of the local area. Thus the Ministry of Agriculture, Forestry and Fisheries will promote the study of biotechnology conducted by the local governmental bodies through education and investigation of genetic resources.

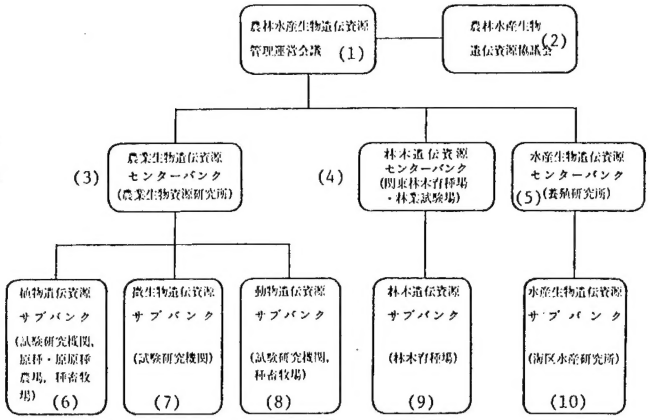
Present Aspects of the Biotechnology Development

As described already, the Ministry of Agriculture, Forestry and Fisheries considering fiscal 1984 as the first year of the biotechnology development, has been promoting biotechnology research. The research results obtained in 1984 will be listed below:

As far as genetic engineering is concerned, DNA libraries have been established from rice, soy bean, potato, cauliflower mosaic virus, and adeno virus. The amino acid and DNA base sequence of seed storage protein have been determined. In addition, DNA base sequence of tobacco mosaic virus which hinders tomato production has been clarified which might result in the production of virus attenuated artificially. On the other hand, transcriptase gene of cauliflower mosaic virus was successfully integrated into yeast to produce the enzyme efficiently. Binary vector which introduces genes into crop plant cells efficiencly was developed. Further utilization of these techniques is expected.

As for cell fusion, it has progressed to regenerate plants from protoplast of many crop plants. Complete regeneration was achieved in the case of wood by the selection and modification of the medium. In addition, cell fusion research project which has been commissioned to the Central Institute of Japan Tobacco and Salt Public Corporation has brought about successful results of the production of fertile tomato by cell fusion between strains now in use and wild type strain for the first time in the world. This hybrid tomato shows the intermediate phenotype of leaf shape of parents and flowers of the wild type strain. The color of the hybrid tomato is purple, a mixture of red color of the cultivating strain and green color of the wild type. Mushrooms with stems of intermediate length have been established by cell fusion between the black long-stem strain and short-stem strain. Sensational results have been obtained in 1 year of research. Therefore further development is looked forward to.

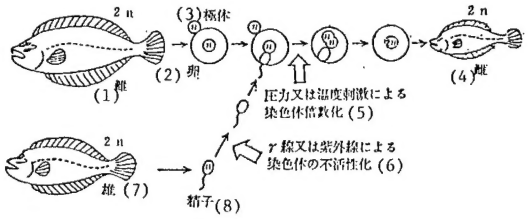
Figure 1. Agriculture, Forestry and Fisheries Gene Bank Enterprise System.



Key:

1. Agriculture, Forestry and Fisheries Biological Genetic Resources Administration and Management Council.
2. Agriculture, Forestry and Fisheries Biological Genetic Resources Conference.
3. Agriculture, Forestry and Fisheries Biological Genetic Resources Center Bank.
4. Forest Tree Genetic Resources Center Bank (Kanto Forest Tree Breeding Institute+Forestry and Forest Products Research Institute)
5. Fisheries Biological Genetic Resources Center Bank (National Institute of Aquaculture)
6. Plant Genetic Resources Sub-bank (research institutes, stock seed farms, foundation stock seed farms and livestock breeding stations)
7. Microbial Genetic Resources Sub-bank (research institutes)
8. Animal Genetic Resources Sub-bank (research institutes and livestock breeding stations)
9. Forestry Genetic Resources Sub-bank (forest tree breeding institute)
10. Fisheries Biological Genetic Resources Sub-bank (sea regional fisheries research laboratories)

Figure 2. Development of Breeding Technology of Fish Using Gynogenesis



Key:

1. Female
2. Egg
3. Polar body
4. = 1. female
5. Duplication of chromosomes by stimulations of pressure and temperature
6. Inactivation of chromosomes by gamma ray or ultra-violet ray irradiation
7. Male
8. Sperm

20,147/8919
CSO: 4306/1535

DEFENSE INDUSTRY

NEW EQUIPMENT ORDERED FOR SELF-DEFENSE FORCES

Tokyo GUNJI KENKYU in Japanese Jul 85 pp 140-143

[Article: "Defense Industry News"]

[Text] NEC, Yokohama Rubber Receives Orders for Development of OQS-X Sonar

Both NEC Corporation and the Yokohama Rubber Co, Ltd had held consultations with the TRDI (Technical Research and Development Institute) and the CPO (Central Procurement Office) concerning a development contract of the OQS-X, a sonar for surface ships including the research and development related to electronic equipment for fiscal 1984. Both companies reached an agreement on the development contract with them and formally received an order for the development of the OQS-X from them in late March of this year [1985].

The OQS-X sonar is being developed to succeed the OQS-4 presently being used in the MSDF (Maritime Self-Defense Force). It will have a capacity of automatically detecting and pursuing enemy submarines and torpedoes. It will be equipped with a signal processor, standardized sensor, rubber sonar dome, etc. That is, it will employ an active/passive simultaneous operation system.

The sonar dome, transducer, etc., will be entirely manufactured on an experimental basis under this development contract, and the signal processor, trouble detector, etc., will be entirely manufactured on an experimental basis in fiscal 1985.

NEC Corporation has received an order for a set of sonars, transmitters, etc., in the amount of ¥749.315 million yen. The Yokohama Rubber Co, Ltd has received an order for rubber sonar domes in the amount of ¥374.445 million. The delivery date in both cases is 31 October 1986.

Komatsu Receives Order for Type-75 Bulldozers

Komatsu Ltd has recently received an order from the CPO for six type-75 bulldozers included in the category B vehicles procured by the GSO (Ground Staff Office) in fiscal 1984. The amount of the order is ¥386.04 million, and the delivery date July 1985.

KHI Receives Orders for Overhaul of Aircraft Engines

Kawasaki Heavy Industries, Ltd has received orders from the CPO for the overhaul of eleven J33A35 engines and five J80560 engines. The total amount of the orders is ¥157.54 million, and the delivery time is December 1985.

IHI Receives Orders for the Overhaul of Various Aircraft Engines

In late March this year, Ishikawajima-Harima Heavy Industries Co, Ltd received orders from the CPO for the overhaul of five J3 engines and two JT809 engines for the ASO (Air Staff Office). The amount of the former order is ¥47.005 million. That of the latter order is ¥41.422 million. The delivery date for both orders is November 1985.

KHI Receives Order for MT Equipment for P3C's

Kawasaki Heavy Industries, Ltd has recently received an order from the CPO for a system of military training equipment such as an armament system for P3C's antisubmarine patrol planes, required by the MSO (Maritime Staff Office). This P3C training equipment is manufactured so that it can be equipped with additional armaments, and hydraulic, and fuel systems related to military training aircraft. The amount of the order is ¥451.250 million, and the delivery date is 30 August 1986.

MSE Receives Order for Diesel Main Engines for AOE's

Mitsui Shipbuilding & Engineering Co, Ltd has held consultations on a private contract with the CPO concerning the 42M diesel engine, main engine for the 8,300-ton-type AOE (Fast Combat Support Ship) included in the MSDF naval building program for the last fiscal year. On 19 March this year, the company reached an agreement on the 42M diesel engine and formally entered into a contract with the CPO.

The 42M system diesel engines have already been mounted in the Shirase, an AGB ship, in fiscal 1979 and the Chiyoda, as AS ship in fiscal 1981. Mitsui 42M diesel engines were scheduled to be mounted in new AOE's in order to consolidate the main diesel engine for transport and auxiliary ships. The total amount of the order for the engine for a ship is ¥1.51 billion, and the delivery date is 25 December 1985.

NMB Receives Order for Type-53 Signal Pistols

Nippon Miniature Bearing Co, Ltd, has recently received an order from the CPO for five type-53 signal pistols required by the MSO. The amount of the order is ¥730,000, and the delivery date is September 1986.

SHI Receives Order for Type-62 Machineguns

Sumitomo Heavy Industries, Ltd has received an order from the CPO for two type-62 7.62-millimeter machineguns. The amount of the order is ¥4.02 million, and the delivery date is September 1986.

MEC Receives Order for Continuous Development of Next Generation Brownout Radar Equipment

In late March this year, Mitsubishi Electric Corporation formally entered into a contract with the CPO for the continuous development (part II) of the XJ/FPS3, next generation of brownout radar equipment for the ASDF (Air Self-Defense Force) which has been under development by TRDI since fiscal 1983.

The next generation brownout radar equipment will be used as a main radar for warning and intercepting control in accordance with the ASDF's BADGE (Base Air Defense Ground Environment) system modernizing project.

This radar equipment employs an up-to-date active phased array system in which two antennas are installed in a site. Also, its ECM (electronic countermeasures), ECCM (electronic counter countermeasures) capabilities can be enhanced because it is equipped with a dummy radiowave generator.

The continuous development of the above radar equipment was contained in the budget for fiscal 1983. Necessary contracts for the development of the above radar equipment will be completed under this development contract. The total amount of this contract is ¥3.104 trillion, and the scheduled delivery date is 30 September 1986.

IHI Received Orders for F100 Engines

IHI had held consultations with the CPO concerning engines for F-15 fighters included in the ASO's aircraft purchasing project for the last fiscal year. In late March of this year, the company won a bid for the engines and formally received orders from the CPO for 34 F100-IHI-100 turbofan engines and 6 maintaining turbofan engines. The amount of the former order is ¥39.559 billion, and that of the latter order is ¥6.85 billion. The delivery date for the former is 31 August 1987, and that for the latter is 29 November 1986.

MHI Formally Receives Orders for Various Fighters

Mitsubishi Heavy Industries, Ltd held consultations with the CPO concerning F-15J and F-1 fighters based on the ASO's aircraft purchasing project for the last fiscal year. On 19 March 1985, the company won a bid for the fighters and formally received orders from the CPO for 17 F-15J interceptor fighters and 3 F-1 supporting fighters. The amount of the former order is ¥91.185 billion, and that of the latter order is ¥4.881 billion. The delivery date for the former is the end of March 1988, and that for the latter is the end of March 1987.

C. Itoh Aviation Receives Order for TC-90 Training Aircraft

In late March this year, C. Itoh Aviation Co, Ltd, entered into a contract with the CPO concerning the import of a TC-90 instrument flight training aircraft included in the MSO's aircraft purchasing project for the last fiscal year, and formally received an order for the aircraft from the CPO. The amount of the order is ¥358 million, and the delivery date is the end of September 1985.

Okura Receives Order for Engines for CH-47's

Okura & Co, Ltd has recently received an order from the CPO for the import of T55-LI-712 turboshaft engines to be mounted in CH-47J helicopters for the GSO and ASO.

The GSO and ASO, respectively required delivery of two at a time. The total amount of the order for four engines is 1.07 billion, and the delivery date for both cases is 28 June 1985.

KHI Receives Orders for Various Aircraft for MSDF

Kawasaki Heavy Industries, Ltd held consultations with the CPO concerning a contract for P3C antisubmarine patrol planes and OH6D training helicopters included in the MSO's aircraft purchasing project for the last fiscal year. The company formally received orders for this equipment from the CPO by the end of March this year.

The number of P3C's ordered was eight, and OH6D's ordered was two. The amount of the former order was ¥38.649 billion, and that of the latter order was ¥289 million. The delivery date for the former is 25 March 1988, and that for the latter is 20 January 1986.

MHI Receives Orders for Various Helicopters for MSDF

In late March this year, MHI reached an agreement on consultations with the CPO concerning various helicopters for the MSDF, and received orders from the CPO for seven HSS2B helicopters and an S61A rescue helicopter.

The total amount of the former order is ¥10.122 billion, and that of the latter order is ¥1.390 billion. The delivery date for the former is the end of March 1987, and that for the latter is the end of October 1986.

IHI Receives Orders for Engines for P3C's

By the end of March, IHI formally received orders from the CPO for T56-14 turboprop engines and auxiliary T56-14 turboprop engines to be mounted on P3C's based on the MSO's aircraft purchasing project for the last fiscal year. The number of the former engines is 32, and that of the latter engines is 3.

The total amount of the former order is ¥8.58 trillion, and that of the latter order is ¥755.94 million. The delivery date for the former is the end of August 1987, and the delivery date for the latter is 25 December 1985.

SMI Receives Order for USIA Flying Boat

In late March this year, Shin Meiwa Industry Co, Ltd received an order from the CPO for an USIA rescue flying boat based on the MSO's aircraft purchasing project for the last fiscal year. The total amount of the order is ¥4.23 billion, and the delivery date is 31 January 1987.

MHI Receives Order for the Third Complete Trial Manufacturing of XSSM-1

In late March, MHI entered into a private contract with the CPO concerning the third complete trial manufacturing of the surface-to-ship guided missile, XSSM-1 required by the TRDI.

This guided missile is designed on the basis of the type-80 ASM-1 antiship missile of the ASDF and is intended to complete the GSDF's beach defense capability. It has already been manufactured on a fully experimental basis since fiscal 1982. The missile is equipped with a jetted sustainer, booster, and updated electronic equipment intended to enhance its electronic jamming capability. According to the future development schedule for the missile, the missile will be subjected to engineering tests from fiscal 1985 to 1986, will be subjected to service tests from fiscal 1987 to 1988, and will be standardized in fiscal 1988, and completed in fiscal 1989.

In this contract, 12 guided missiles, ground testing equipment, materials, etc., will be made on an experimental basis with a view toward checking the terminal guidance function. The total amount of the order is ¥5.409 billion, and the delivery date is the end of September 1986.

Komatsu and MHI Receives an Order for Type-73 APC's

Both Komatsu Ltd and MHI have recently received an order from the CPO for 15 type-73 APC's (armored personnel carriers) included in the category A vehicles procured by the GSDF in fiscal 1984.

Of the 15 type-73 APC's, 6 type-73 APC's and 9 type-73 APC's will be manufactured by Komatsu Ltd and MHI, respectively. The amount of the former order is ¥443.7 million, and that of the latter order is ¥665.55 million. The delivery date for both orders is 25 December 1985.

Ohhara Iron Works Receives Order for Type-78 Snowmobiles

Ohhara Iron Works, Ltd has recently received an order from the CPO for 22 type-78 snowmobiles based on the category A armaments procured by the GSDF in fiscal last year. The total amount of the order is ¥586.74 million.

Yuasa Battery Receives Order for Submarine Batteries

At the end of March, Yuasa Battery Co, Ltd won a bid for main batteries for 2,200-ton type submarines included in the shipbuilding procurement plan for the last fiscal year, and formally received an order from the CPO for these main batteries.

The total amount of the order is ¥1.623 billion.

MC Receives Order for Import of Second SH60B

Mitsubishi Corporation, a selling agent of Sikorsky Co, Ltd, in the United States, had held consultations with the CPO concerning the import of the

second SH60B. This follows agreement on the input of the first SH60B for fiscal 1983. The company formally received an order from the CPO for the import of the SH60B's by the end of March.

It has been determined that these two SH60B's will be imported as testing helicopters for the next generation of ship-based antisubmarine helicopter systems, XSH60J's, for the MSDF. On the basis of the contract, the first and second SH60B's will be completed at the MHI's Komaki Minami Factory in February and June 1986, respectively. The amount of the order is ¥3.333 billion, and the delivery date is the end of June 1986.

Tokyo Keiki Receives Order for Gyrocompass

Tokyo Keiki Co, Ltd, has received an order from the CPO for a gyrocompass, ES-2B-2 required by the MSO. The amount of the order is ¥3.5 million, and the delivery date is June 1985.

Sanyo Electric Receives Order for Various Engine Driven Generators

Sanyo Electric Co, Ltd has recently received an order from the CPO for engine driven generators for the MSO, N-PU-87C, N-PU-88C, N-PU-89C, and N-PU-102, one by one. The total amount of the order is ¥26.847 million. The delivery date for the N-PU-87C is June 1985, and that for the rest is November 1985.

Toshiba Receives Order for Short-Range SAM's for GSDF and ASDF

At the end of March, Toshiba Corporation entered into a private contract with the CPO concerning the type-81 short-range SAM (surface-to-air missile) included in the surface-to-air guided missile maintenance plan for the last fiscal year. It formally received an order from the CPO for 10 sets of the systems.

Type-81 short-range SAM's have been deployed since fiscal 1981 as air defense firearms in the GSDF's divisions and the ASDF's air bases. The cost of eight sets of the systems for the GSDF and five sets of the systems for the ASDF has been appropriated in the budget for this fiscal year.

Also, the amount of seven sets of the systems for the GSDF is ¥14.468 billion, and that of three sets of the systems for the ASDF is ¥7.897 billion. The delivery date for the former is 28 December 1986, and that for the latter is 29 November 1986.

JAM Receives Order for Periodic Repair Work of P2J

Japan Aircraft Mfg Co, Ltd has received an order from the CPO for repair work periodically of the P2J antisubmarine patrol plane. The total amount of the order is ¥55.475 million, and the delivery time is September 1985.

20,143/8918
CSO: 4306/2547

SCIENCE AND TECHNOLOGY POLICY

OVERVIEW, TRENDS OF SUPER PROJECTS DESCRIBED

Nine Large-Scale Projects

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 6-26

[Article: "Overview of Super Projects--The Leading Stars of the 21st Century"]

[Excerpt] Urban Development Begins Moving

Attention should be drawn to a movement already started, i.e., the urban redevelopment projects referred to by Prime Minister Nakasone as the "Urban Renaissance." Those already appearing on a private basis are the "Yokohama Minato Mirai (Harbor Future) 21 Project," the "Kawasaki Station Peripheral Cities Readjustment Project," and the "Okawabata Redevelopment Project."

The sum totals for these projects are: the "Yokohama Minato Mirai 21 Project," Y2 trillion for 1983-2000; the "Kawasaki Station Peripheral Cities Readjustment Project," Y600 billion for 1983-2000; and the "Okawabata Redevelopment Project," Y200 billion for 1984-1990. Seemingly in response to such a move in the private sector, the government is beginning to take a concrete step, which is reflected in the fiscal 1985 budget for a projected increase in the appropriation for urban redevelopment.

The sum total of the public utility appropriation for fiscal 1985 related to the Construction Ministry amounts to Y13,167 trillion, a 2-percent increase over the initial budget for the previous year. It also represents an increase for the first time in the past 6 years, of which the appropration for the urban area redevelopment project related to the urban redevelopment accounts for Y36.2 billion in the general account, a notable increase of 28 percent. Also, the appropriation budgeted in fiscal 1984 for the high-grade development building improvement promotion project amounts to Y825 million, an increase of 27 percent. These reflect the position of the government and the Construction Ministry which are gearing up for urban redevelopment. In addition to this, the "release of government properties" is anticipated.

Though they cannot exactly be called government properties, the National Railways has been stepping up efforts to use its out-of-use sites at Kinshi-cho, Shinagawa, Higashi-Yokohama, Shinjuku, Shiodome, and Umeda, at present. Prime Minister Nakasone, irritated by this, told the government to investigate the action and to officially announce the sites, which may number 48.

The 48 sites totaling an area of 143,000 square meters around the metropolitan area including Yokohama City, are former sites for official residences of the Tokyo Immigration Bureau, Regional Maritime Safety Headquarters, Ground Self-Defense Force, and Maritime Self-Defense Force. The aforementioned cover an area totaling about 6,000 square meters. In Chiba Prefecture, there are those of the District Public Prosecutor's Office, Yokohama Custom-House, Kanto District Transport Bureau. Total area of these is about 4,800 square meters. Besides the above, the government is to pick up about 4,400 sites throughout the nation to make up a list of government properties which can be reused and redeveloped.

In addition to such a move, urban redevelopment projects on a private basis have begun with new projects in the Akasaka and Roppongi areas, the east side area of Osaki Station, and the former site of Ebisu-Sapporo Beer Co.

Urban redevelopment is certainly one of the major projects; however, what should be watched are the projects which are to be handled cooperatively by the government and the private sector. Of such projects, the first worth watching is for the Kansai New Airport. Work should commence within fiscal 1985 by Kansai International Airport Co.

The scale of the undertaking is so great that the direct project cost and the project cost involving it amount to Y1 trillion and Y3 trillion, respectively, for the first-term project for fiscal 1985-1992 alone; its inducement is expected to reach Y6.5 trillion. For this reason this project has been drawing attention not only because of the scale of its direct project cost, but because of the opportunities it creates for investment. The big projects currently under embodiment are:

First, the Metropolitan Area Reconstruction Project, which is based on Tokyo metropolis' "My Own Tokyo" concept which aims to revitalize people's homes in the giant city of Tokyo where human alienation reportedly is rampant and the National Land Agency's draft for metropolis is already on the drawing boards.

According to the metropolis reconstruction conception draft, the metropolitan area--covering 50 to 70 km from the central part of the metropolis--is to be reconstructed into multinucleus, multiarea type regional structures which have plural nucleuses and areas from the current single pole dependent structure with the central part of the metropolis as its top. For this, business nuclear cities will be fostered in the periphery of the ward sections of the metropolis, centering around new communities (independent urban areas) formed on the basis of individual regional characteristics. Those named as nuclear cities are: Tama independent urban area, Tachikawa and Hachioji; Kanagawa independent urban area, Yokohama and Kawasaki; Saitama independent urban area, Omiya and Urawa; Chiba independent urban area, Chiba; Ibaraki independent urban area, Tsuchiura; and Tsukuba Academic Town. This conception also includes urban redevelopment projects furthered on a private basis such as the "Yokohama Minato Mirai 21 Project" and the "Kawasaki Station Peripheral Cities Readjustment Project."

Second, the "Cross Tokyo Bay Highway Project," which plans to connect Kisarazu City, Chiba Prefecture, and Kawasaki City with a submarine tunnel totaling 15 km in length and a bridge. They will, together with Tokyo Bay Coast Highway and Cross Bay Mouth Highway (on the drawing board), form Tokyo Bay Loop Highway. The project is to begin in fiscal 1985 and is expected to be completed in fiscal 1995. Investment for the project is estimated at approximately Y900 billion.

Third, the "Haneda Airport Offshore Development Project," working in conjunction with the Tokyo Metropolis' Phoenix Project and the Tokyo Bay Coast Highway Project, involves reclamation of the offing of present Haneda Airport, transferring the airport here and having Tokyo Bay Coast Highway run here also. The total project cost is estimated at around Y1 trillion.

Also under consideration and not to be ignored is a transfer issue to move Tokyo International Airport to Haneda. The construction of the present airport at Narita was commenced in the second-term work; however, it has a notorious reputation internationally because it is too far from the major population center. Therefore, plans to make it an air cargo terminal and restore Haneda as an international airport for passengers has been suggested. However, since at present Haneda Airport lacks the capacity to make this change, it will be postponed for future consideration.

These are the main big projects, and when underway will have an impact on the economy. It is believed that furthering such big projects to satisfy expanding domestic demand will complement the effort. [See table]

Without prospects of economic expansion heavy industry is in trouble while high tech and export industries are prospering, creating a conspicuous gap. It may be referred to as a mere change in the industrial structure; however, it should not be overlooked that the recent stagnation in social overhead capital investment is responsible.

The prosperity of high-tech industries does not create sufficient employment opportunities that are needed. Drawing away of employment by the tertiary industries does not lead to expanded production. This is a grave issue affecting Japan's future economy.

In this context, when the big projects are furthered on a full-scale basis, they will have a favorable impact on heavy-huge industries and the gap between the industries will be closed, resulting in a great contribution to the Japanese economy.

It is the construction business that will directly profit from these big projects when they get underway. The construction business circles are currently stagnated by sluggish public investment; businesses are concerned with the survival of their overseas activities. However, the full-scale big projects will bring about a recovery in the domestic economy.

Research and Development System for Next-Generation Industrial Basic Technologies

	R&D theme	Period planned (years)	Appropriation (approximation in billions of yen)	Private Licensee	Number of enterprise	Name of private enterprise	National research institute
New Material	Fine ceramics	10	13	Fine Ceramics Technology Research Association (15 firms)	15	Asahi Glass Co., Ishibashi Co., Inoue Japax Research Institute, Kyocera Corp., Kurosaki Refractories Co., Kobe Steel, Ltd., Shinagawa Refractories Co., Showa Denko K.K., Sumitomo Electric Industries, Ltd., Denki Kagaku Kogyo K.K., Toshiba Corp., Toyota Motor Co., Toyada Machine Works Ltd., NGK Insulators Co., NGK Spark Plug Co.	Government Industrial Research Institute, Nagoya; Mechanical Engineering Laboratory, Government Industrial Research Institute, Osaka; Inorganic Materials Research Institute
	High-efficiency polymeric materials	10	10	Polymer Basic Technology Research Association (11 firms)	9	Asahi Chemical Industry Co., Asahi Glass Co., Sumitomo Electric Industries Co., Daisel Ltd., Teijin Ltd., Toyobo Co., Toray Industries, Inc., Mitsubishi Chemical Industries, Ltd., Kuraray Co.	Chemical Engineering Research Institute, Industrial Products Research Institute, Research Institute for Polymers and Textiles
	Conductive polymeric materials	10	5		5	Asahi Chemical Industry Co., Sumitomo Chemical Co., Sumitomo Electric Industries, Ltd., Teijin Ltd., Toray Industries, Inc.	Electrotechnical Laboratory, Research Institute for Polymers and Textiles
	High crystalline polymeric materials	10	6		5	Asahi Chemical Industry Co., Toray Industries, Inc., Mitsubishi Chemical Industries, Ltd., Teijin, Ltd., Mitsubishi Petrochemical Co.	Research Institute for Polymers and Textiles
	High performance crystallization control alloy	8	8	Foundation for Next-Generation Metal/Composite Materials Research and Development Association (17 firms)	7	Ishibashi Co., Hitachi Metals, Ltd., Hitachi, Ltd., Mitsubishi Metal Corp.'s Central Research Institute, Kobe Steel, Ltd., Daido Steel Co., Sumitomo Electric Industries, Ltd.	Mechanical Engineering Laboratory, Government Industrial Research Institute, Nagoya; Metal Materials Engineering Research Institute
	Composite materials	8	11 (totaling 53)		11	Toray Industries, Inc., Teijin Ltd., Mitsubishi Chemical Industries, Ltd., Nippon Carbon Co., Fuji Heavy Industries, Ltd., Ishibashi Co., Kawasaki Heavy Industries, Ltd., Toshiba Machine Co., Toyota Motor Co., Mitsubishi Electric Corp.	Industrial Products Research Institute, Mechanical Engineering Laboratory, Research Institute for Polymers and Textiles, Industrial Research Institute, Osaka

[continued]

[continuation of Research and Development System for Next-Generation Industrial Basic Technologies]

	R&D theme	Period planned (years)	Appropriation (approximation in billions of yen)	Private licensee	Number of enterprise	Name of private enterprise	National research institute
Biotechnology	Bioreactor	10	11	Biotechnology Development Technology Research Association (14 firms)	6	Mitsubishi Chemical Industries, Ltd., Kao Soap Co., Daicel, Ltd., Mitsubishi Gas Chemical Co., Denki Kagaku Kogyo K.K., Mitsui Petrochemical Industries, Ltd.	Fermentation Research Institute for Polymers and Textiles, Chemical Engineering Research Institute
	Cell mass culture	9	5		5	Kyowa Hakko Kogyo Co., Asahi Chemical Industry Co., Ajinomoto Co., Takeda Chemical Industries Co., Toyo Jozo Co.	Fermentation Research Institute, Research Institute for Polymers and Textiles, Chemical Engineering Research Institute
	Recombined DNA application technology	10	10 (totaling 26)		3	Sumitomo Chemical Co., Mitsui Toatsu Chemicals, Inc., Mitsubishi Chemical Industries' Biotechnology Research Institute	
New functional element	Super-lattice structure elements	10	8	Foundation for New Functional Element Research and Development Association (10 firms)	3	Fujitsu, Ltd., Sumitomo Electric Industries, Ltd., Hitachi, Ltd.	Electrotechnical Laboratory
	Three-dimensional circuit elements	10	9		7	Nippon Electric Co., Oki Electric Industry Co., Sharp Corp., Toshiba Corp., Mitsubishi Electric Corp., Matsushita Electric Industrial Co., Sanyo Electric Co.	Electrotechnical Laboratory
	Environmental hazard-resistant elements	8	8 (totaling 25)		3	Hitachi, Ltd., Toshiba Corp., Mitsubishi Electric Corp.	Electrotechnical Laboratory
Total	12 themes		104	67 firms			

Urban redevelopment will be undertaken by acreage estate companies. The big projects will increase the demand for construction materials--basic materials such as cement and steel, plus secondary materials such as iron and steel goods. Indirectly, land transportation businesses and retail businesses should consequently profit.

The big projects are wide in scope and affect various sectors of the population. For instance, the Ministry of Finance is negative about them due to fiscal difficulties. But the projects can be furthered by adopting the third sector method to introduce private capital, as is the case with Kansai New Airport. Private funds have swollen, therefore, it would not be difficult to further the big projects if these funds were utilized instead of merely operating in the finance and capital markets, as is the case at present.

Space Development

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 10-11

[Article: "Decision To Participate in the U.S. Space Station--Designing the Original Testing Module"]

[Text] Space Development Takes a New Turn

Japan's full-scale space development started in 1955, when an appropriation was made for space development for the first time by the Institute of Industrial Science, University of Tokyo. Success was realized during the first test of its pencil rocket in the same year. It is 30 years since the history of space development started. Now it is entering a new phase, showing active progress toward its practical use.

In 1978, the "Space Development Policies Guideline" was formulated; however, because of the rapid progress in space development, it was reviewed in 1984 and rewritten offering new guidelines for space development in the future. Space development is facing a new phase not only systemwise but application-wise. In response to the U.S. request to join its space station program, corporations have been chosen to design Japan's original experimental modules. Furthermore, because of the rapid development in space technology, Japan is interested in purchasing communications satellites from the United States.

The nucleus of space development is the Space Activities Commission, which keeps track of space development conducted by individual organs and shares its findings with the prime minister. It has thus far shown important space development guidelines such as the "Space Development Policies Guideline" formulated in 1978, the same guideline reviewed in 1984 and the "Basic Concept on Participation in the Space Station Program."

The actual development is conducted by the Institute of Space and Astronautical Science (ISAS) and the National Space Development Agency (NASDA). NASDA is concerned with the practical application of space technology and is working on the development of artificial intelligence and rockets. ISAS is interested in academic research.

Space development is entrusted to NASDA and ISAS, which are supported by the space development appropriation. In Japan approximately Y110 billion was budgeted for space development over the past few years. The appropriation is mainly for research and development by the Science and Technology Agency in charge of the appropriation for NASDA and the Ministry of Education, Culture, and Science which superintends ISAS, both occupying around 90 percent of the appropriation for space development. However, it appears insufficient.

The U.S. appropriation for space development for fiscal 1983 amounted to as much as Y1.557 trillion, 13.7 times that of Japan, showing a clear gap in the scale of appropriations between the two countries. The European Space Agency's (ESA) appropriation for the same year also accounted for Y182.9 billion, 1.6 times that of Japan. As for European countries, though partially overlapping ESA's, France's appropriation for the same time period accounted for Y111 billion, and West Germany's Y73.1 billion.

Looking ahead, monetary appropriation for space development is not likely to increase because of Japan's tight national finance policy, however, this can change when there are good prospects of a growing tendency toward use of space and furtherance of international space development--such as joining the U.S. space station program which likely needs Y300 billion.

Space development has been conducted according to the "Space Development Policies Guideline" formulated in 1978. However, it was reviewed in 1984, some 5 years after its decision, because of increased understanding of use of space and furtherance of international projects. The new guideline delineates space development for the next 15 years. Its main points are the development of an H-II rocket encouragement of international cooperation.

Rockets currently in use are N-II types. The H-I rocket is scheduled to be launched in fiscal 1985; however, its capacity of launching a satellite in a stationary orbit is no more than 550 kilograms. Therefore, the new guideline urges the development of an H-II rocket, which will be a domestically manufactured large-sized one capable of launching a 2,000-kilogram stationary satellite. This is to be completed in fiscal year 1990 with Y200 billion to be thrown in. When completed, the H-II rocket will be provided with a launching capacity corresponding to that of the U,S. space shuttle and ESA Alian.

International cooperation, and above all, Japan's participation in the U.S. space station program is extremely important. The space station, targeted at operating by 1992 by NASA, involves a combination of six to eight modules, conducting material experiments and manufacturing pharmaceuticals by six to eight astronauts staying in it and taking partial charge in an orbit around the earth. The cost needed for that is estimated at Y2 trillion.

Main Enterprises Charged With Preliminary Design of Japanese Module

Company name	Charged field
Mitsubishi Heavy Industries, Ltd.	Entire administration, system design of pressurized compartment and supply system
Ishikawajima-Harima Heavy Industries Co.	Entire administration, system design of exposed parts
Kawasaki Heavy Industries, Ltd.	Design of mechanical system and environmental control subsystem
Nissan Motor Co.	Exposed structure subsystem
Mitsubishi Electric Corporation	Electric power subsystem
Nippon Electric Co.	Communication control subsystem
Toshiba Corporation	Design of manipulator subsystem
Hitachi, Ltd.	Design of manipulator subsystem
Fujitsu, Ltd.	Experimental module operation
SDC Japan, Ltd.	Experimental module operation

Responsible Enterprises for Preliminary Designing Are Firmed

Japan's original experimental modules to be mounted on the U.S. space station have been determined. The pressurized compartment and supply system of the experimental module bodies, and system design of the exposed parts, a service platform outside of the experimental modules, will be done by Mitsubishi Heavy Industries, Ltd. and Ishikawajima-Harima Heavy Industries Co., respectively, with eight other firms charged with the design of the subsystems.

Heavy industry electric equipment companies and automobile manufacturers will be involved in Japan's space development program. They have been chosen because they have fostered technologies over a long term, employed talented personnel, and possess a strong corporate makeup. The new technologies obtained through their space development will be accumulated to be utilized in their main business, thus offering them a favorable cycle.

Space development is largely divided into the rocket system and the satellite system. Enterprises designated to develop rocket systems are Mitsubishi Heavy Industries, Ltd., Ishikawajima-Harima Heavy Industries Co., and Nissan Motor Co. Individually, Toshiba Corporation is in charge of a broadcasting satellite, Mitsubishi Electric Corporation a communications satellite, and Nippon Electric Co. a weather satellite. Besides these, Hitachi, Ltd., Fujitsu, Ltd., and Kawasaki Heavy Industries, Ltd. are in the forefront of space research.

In addition, the following firms will be engaged in the space station program through their individual specialized fields: the fuel system--Teisan K.K., Daido Oxygen Co., Ltd., Daicel Ltd., Nippon Oils & Fats Co., and Iwatani & Co.; the electric system--Oki Electric Industry Co., Iwatsu Electric Co., Japan Radio Co., Ltd., Sharp Corporation, Kokusai Electric Co., Japan Aviation Electronics Industry, Ltd., Yokogawa Hokushin Electric Corp., Ushio Electric Inc., Koito Manufacturing Co., Ltd., Shimazu Seisakusho Ltd., and Tokyo Keiki Co., Ltd.; and the rocket system--Fujitsu, Ltd., Showa Aircraft Industry Co., and Japan Aircraft Manufacturing Co.

Information Network System

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 12-13

[Article: "Construction With NTT as Nucleus--Birth of a Y100 Trillion Market in the 21st Century"]

[Text] Progress of the INS Project

Much is expected of the information network system (INS) which Nippon Telegraph and Telephone Co. has been developing as the largest project of the century.

As diversification of social and economic situations widens, the importance of information increases. Diversification, higher efficiency, and sophistication of information are in great demand. The pace for a high post-industrial informative society in the 21st century is likely to be further accelerated. The INS is being constructed as an infrastructure to support the upcoming high post-industrial informative society with Nippon Telegraph and Telephone Co. at its nucleus.

The INS aims at integrating communication networks functioning separately at present such as telephone, telex, data communication, and facsimile into a single one to enable these various pieces of information equipment to be used via a single telephone line. On top of it, the charge for these services is to be made almost uniform nationwide to realize "more convenient telecommunication services provided with more abundant functions." Technically, analog communication networks are to be changed into digital communication networks based on a combination of 1 and 0 optical fibers to be used for transmission networks instead of present coaxial cables. At the same time, communication lines via communication satellite are to be used. When this concept becomes reality, various communication services such as facsimile and image communication, will be available to general households for economical charges. Then not only home shopping and home banking, but home study or home employment will not be a mere dream.

Schedules to implement the INS can be divided into three stages: The first stage--laying of optical fiber cables throughout the nation and carrying out model system services (until March 1987) centering around Mitaka and Musashino areas of Tokyo--has been completed. The second stage is expansion of the system nationwide to provide services of a practical nature which were offered

since March at the Tsukuba International Science and Technology Exposition. This will begin in the central areas of Tokyo, Osaka, and Nagoya.

The third stage will begin in the mid-1990's and continue for the next decade. Early in the 21st century, the entry into the INS will be possible nationwide and the INS will be completed by the incorporated telephone, nontelephone, and image systems. At the end of 1984 the reform of the telecommunication system was completed with environmental readjustment underway.

A Y20 Trillion Investment of the NTT

We must wait until the 21st century to see the completion of the INS; however, new media and services via a communication link are already emerging, namely, the INS model system in Mitaka and Musashino areas of Tokyo, urban type bi-directional CATV (community antenna television system), CAPTAIN (character and pattern telephone access), VAN (value added network), and LAN (local area network).

Capital investment thrown in by Nippon Telegraph and Telephone Co. for the construction of the INS is likely to reach Y20 trillion by the 21st century, increasing to an expected Y100 trillion with that of peripheral sectors put together. Amid the increasingly intense trade friction issue, it is the very "mallet of luck" (a magical mallet to produce treasures to present people used by a merciful god in a Japanese myth) for domestic demand expansion. It is a "mouthwatering" market not only for domestic related industries but overseas counterparts, and likely to cause further intense political pressure from overseas and to result in active movement without fail both home and abroad.

Aiming at having access to this massive market, firms such as Hitachi, Ltd., Fujitsu, Ltd., and Nippon Electric Co., are reorganizing their mass-production systems for digital converters, relays, and optical communication devices for the INS. On the other hand, it is fresh in our memory that in the foreign economy policy decided at the beginning of April with respect to telecommunication, simplification of technical standards for terminal components was forced to be included in the United States.

The INS is, so to speak, a composite system using high technology. Its formation can be realized exclusively by fully using such technologies as optical fiber cable transmission, digital conversion, satellite communication, and super LSI. Therefore, these technologies are to have an impact on related manufacturers as well as those of new media. Of the many groups of products comprising the INS, those in greatest demand are the optical communication system and its related equipment.

Incidentally, the "Future Vision of the Photo Industry" by the Photo Industry Engineering Association expects the yearly scale of the photo industry to show an annual average increase of 22 percent to increase from the present Y430 billion to Y12 trillion yen in fiscal year 2000; in the meantime, the optical communication system is expected to grow from Y50 billion to Y3.9 trillion, and the optical fiber from Y38 billion to Y1.28 trillion, reflecting

Main Photo-related Products and Enterprises Involved

Firm name	Optical part		Optical equipment		
	Light emitting/ receiving element	Miscellaneous	Optical transmission equipment	Light measuring instrument	Photo application system
Hitachi, Ltd.	◎	◎	◎		◎
Toshiba Corporation	◎	○	◎		◎
Mitsubishi Electric Corporation	◎	◎	◎		◎
Nippon Electric Corporation	◎	○	◎		◎
Fujitsu, Ltd.	○	○	◎		◎
Oki Electric Industry Co.	○	○			◎
Iwatsu Electric Co.				○	
Matsushita Electric Industrial Co.	◎		◎		◎
Sanyo Electric Co.	◎				
Sharp Corporation	◎		○		
Sumitomo Electric Industrial Co.	◎	○	◎		◎
Anritsu Electric Co.	◎	○	○	◎	
Japan Aviation Electronics Industry, Ltd.		◎	◎		
Hirose Electric Co.		○			
Showa Musen Kogyo Co.		○			
Okura Electric Co.			○	○	
Chino Works, Ltd.				○	
Yokogawa-Hokushin Electric Corp., Ltd.		○			
Ushio Electric Inc.	○			○	
Ando Electric Co.		○		◎	
Stanley Electric Co.	◎				
Hamamatsu Photo Co.	○	○			
Alps Electric Co.		○			
Sony Corporation	◎				○
Omron Tateishi Electronics Co.	○			○	
Hoya Corporation	○				
Hoshiden Electronics Co.		◎			
Horiba, Ltd.	◎				
Koita Manufacturing Co.	◎				
Shimadzu Seisakusho, Ltd.		○		◎	
Canon Inc.					◎
Ricoh Co.					◎

Note: ◎ mark indicates a firm with great expectancy.

annual growth rates of 29 percent and 23 percent, respectively. Sales of optical fibers of the following firms are currently showing a sharp increase: manufacture of quartz fibers, led by the reputed "electric-wire big three" of Sumitomo Electric Industries, Ltd., Furukawa Electric Co., and Fujikura Cable Works, Ltd., and followed by Hitachi Cable, Ltd., Dainichi-Nippon Cables, Ltd., Showa Electric Wire & Cable Co., Nippon Sheet Glass Co., a multicomponent fiber manufacturer, and Mitsubishi Rayon Co., a plastic fiber manufacturer. Even though a round of main line laying has been completed, a new increase in demand by expanded branch line networks, such as LAN's and CATV's can be expected, thus offering good prospects of a continuous steady increase in the coming years. Expectations are also placed on other manufacturers of various photo-related parts, components and devices such as light emitting and receiving elements, optical transmission parts, light measuring instruments, and photo sensors.

In addition, the demand for various terminal customer station equipment such as digital telephones, videophones, and picture response systems which are directly connected to an INS network to be used will most likely increase. A large number of them were used for the model experiment in Mitaka, Tokyo. As laying of optical fibers expands throughout the nation, the customer station equipment market is also expected to be in step.

Energy Stockpile

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 14-15

[Article: "Investment for Constructing Station Totals Y2.5 Trillion--Three Potential Areas for Underground Stations"]

[Text] Indication of an Underground Crude Oil Stockpile Project

Effective use of underground space is impending. The use of underground space can already be seen in the areas of subways, underground towns, sewerages, and underground laying of communication facilities, but recently it has been sought after as a countermeasure against progress in urbanization and also as a stockpile base for energy and foods.

Above all, worth watching is an underground stockpile base for crude oil involving the national petroleum stockpile project. The initiation of the underground stockpile base construction project for petroleum was negotiated between cabinet ministers toward the end of 1984, but only recently has it been brought into focus. Japan's dependence on imported oil is almost 100 percent, 70 percent of which is obtained from the Middle East via the Strait of Hormuz. If the situation becomes unstable in that area, supplies would be directly affected.

In this context, and from the standpoint of economic security, private enterprises subsidized by the government are required to stockpile a 90-day supply of petroleum under the law. In addition, the Petroleum Corporation is requested to increase the national stockpile, from the present approximately 15 million kl (as of June 1984) to 30 million kl by the end of fiscal year 1988.

Constant stockpiling of this national target of 30 million kl needs stockpiling bases with a capacity of at least 40 million kl. To accomplish this, construction of ground stockpile bases at seven sites such as Ogawara (Aomori Prefecture) and the east part of Tomakomai (Hokkaido) are on the drawing board.

Mutsu-Ogawara petroleum stockpile base, covers an area of 2.24 square km and houses fifty-one 10,000-kl crude oil tanks. Of the 51 tanks constructed, 29 have been filled with oil, amounting to approximately 3.1 trillion kl with the remaining 22 tanks scheduled to be filled up by the end of September 1985. The total cost for the Mutsu-Ogawara project is expected to reach Y165 billion.

East Tomakomai petroleum stockpile base, already having 28 tanks, will be enlarged to house more tanks to reach a total capacity of 6.2 million kl. The existing 28 tanks were filled up at the end of 1984 and construction of the additional 27 tanks as the next-term project will be promoted in the future. Their completion is scheduled for fiscal year 1990, costing approximately Y9 billion has been invested. The total cost of both the Mutsu-Ogawara and East Tomakomai projects will probably amount to Y1.7 trillion.

In addition to the above, the project includes gradual petroleum stockpiling at bases at Shiroshima, Fukui, Akita, Kami-Goto, and Shibushi.

However, even if these ground stockpile bases are all completed, their stockpile capacity will be no more than 35 million kl. To complement this effort a project is underway for underground stockpile bases with a capacity of 5-10 million kl in addition to these ground bases.

The advantages of stockpiling petroleum underground rather than in surface facilities are: 1) an extremely small surface area of a site can be utilized; 2) use of the bedrock itself for a tank makes it corrosion free and inexpensive to maintain; 3) a closed tank gives high safety and national defense advantages. The construction cost for an underground base is said to be 10-20 percent lower than that for ground stockpile facilities, estimated at approximately Y160 billion per base.

There are three designated sites for underground stockpile bases: The first is at Kuji (Iwate Prefecture), the second at Kikuma (Ehina Prefecture), and the third at Kushigino (Kagoshima Prefecture). Feasibility studies were conducted by boring. At Kikuma, a demonstration test was successfully completed in fiscal 1979 and the site was prepared for construction.

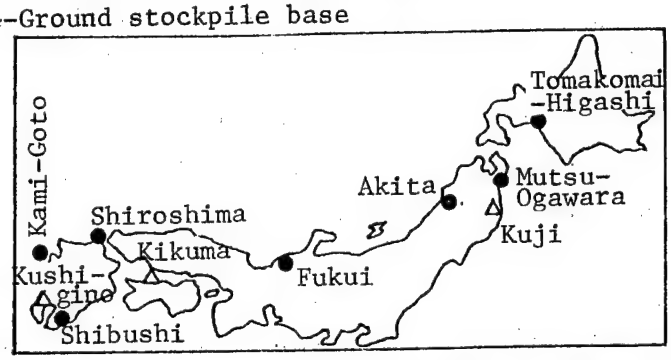
The total investment needed for construction of these ground and underground stockpile bases is estimated at approximately Y215 trillion and are especially profitable for construction firms.

Liquefied natural gas (LNG) can also be stockpiled underground. Methods used to stockpile liquefied gases such as LNG and liquefied petroleum gas (LPG) include the cold high pressure method and the low temperature atmospheric method. In the case of a large capacity stockpile, the latter method is most economically advantageous. It is largely divided into the underground method and the ground method, while a large number of bases have been constructed by the former method in Japan.

Incidentally, the number of LNG underground tanks in Japan totals 50 including those under construction. Nineteen tanks were constructed by the Shimizu Construction Co. and the Kajima Corporation constructed 14 tanks. These two companies together constructed nearly 70 percent of the total tanks in Japan.

These two firms were also heavily relied on because of technological barriers; i.e., an LNG underground tank requires a high level of technologies such as execution of underground walls--controlling peripheral earth pressure, combination of walls, obtaining vertical precision of walls, etc.--and extremely low temperature analysis of tanks. Companies which can accomplish these requirements will likely receive orders for jobs involving crude oil underground stockpile in the future.

△--Underground stockpile base
●--Ground stockpile base



Tomakomai-Higashi and Mutsu-Ogawara bases have been partially completed

Construction Sites for National Petroleum Stockpile Bases

Twenty firms were in competition with one another to design an underground stockpile base for crude oil. A combination of four firms represented by the Shimizu Construction Co., followed by Kajima Corporation, Taisei Construction Co., and JGG Corporation succeeded in obtaining the order. Though the demonstration plant at Kikuma is small in scale with a capacity of only 25,000 kl, and the amount of the order accepted was no more than Y3.5 billion, it is expected to bring in many more orders for the full-scale production of stockpile plants.

While the priority for commencement of work with the crude oil underground stockpile project is drawing attention, the Agency of Natural Resources and Energy intends to first conduct close investigation of earth pressure and water content of geology at the above-mentioned three sites in fiscal 1985 and to start the preliminary design in descending order of their results. The agency plans to decide the stockpile amount by the preliminary design to conclude the final sites.

Creative Science Projects

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 16-17

[Article: "Changing 21st Century Industrial Structure--A Challenge on the Nine Projects"]

[Text] Joint Governmental and Private Sector Project of National Level

Industry, academics, and the administration agree to the idea that in the decade beginning 1985, research and development of science and technology will be positively developed to improve people's living in the 21st century. Individual sectors will pursue high technology and fundamental research projects. There are indications that the 21st century will face technological innovations which can largely reform industrial structures thereby redistributing power in the world economy. Not only the Science and Technology Agency but also the Ministry of International Trade and Industry (MITI) regards fiscal 1985 as the "first year of technological development" and is placing greater importance on the development of high technology from their limited frame of appropriation with a large number of new research themes included.

The reasons why the administration has thrown more energy than ever before into technological development are:

(1) Japan's technological development lags behind in terms of basic and applied research compared with major powers.

(2) Leverage against the basic materials industries has achieved good results under the Industrial Structure Law.

(3) The Law for Temporary Measures Concerning Specified Machinery and the Information Industry, the conventional high technology measures, will expire in 1985.

An unprecedented but conspicuous point is the implementation of deregulation such as reflected in the establishment of the "Government-Private Sector Joint Collaboration System" and the common ownership of patents.

Of the administration's basic and applied research projects, particular attention should be paid to the "Creative Science and Technology Furtherance Projects" (CSTF Projects) by the Research Development Corporation of Japan and the "Next-Generation Industries Base Research and Development System" by the Agency of Industrial Science and Technology, MITI. They are both long-term technological development projects so immediate performance results cannot be expected, but their importance cannot be overlooked.

The CSTF Projects were suddenly spotlighted by Nishizawa's Perfect Crystal Project, which is drawing attention because of its unique research system which exclusively centers on personnel and the great number of results it has so far achieved as reflected in its 170 patents, including those applied for.

Challenges are being made to the six projects listed in the attached table and the seven themes of "Horigoshi's Special Environment Microorganism Project" (added in fiscal 1984) with two more, the "Nano Mechanism Project" and the "Solid Surface Project," newly added in fiscal 1985. The contents of these projects are as described below.

Challenge of Unexplored Science and Technology

Hayashi's Ultraparticulate Project

An ultraparticulate means a metal or a metal compound below one-tenth micron in size. This project involves a study on producing ultraparticulates with a constant grain size, clarification of their idiosyncracies--low melting points, high magnetic property, and high catalytic property, and thereby pursuing their application feasibility as a new material. The future technological development of the project targets at developing magnetic record materials with the recording density 10 times the present one, and solid fuel with combustion efficiency 100 times the present one. The total research cost is estimated at approximately Y2 billion extending over a 5-year period starting in 1981.

Masumoto's Special Structure Substance Project

The project involves pursuing the feasibility of its applications to new ceramics, electric, optoelectronics, and catalytic materials. Expectations are placed on developing magnetic materials with a speed of response 10 times the present one and metallic materials with corrosion resistance 1,000 times the present one. Its research period covering 5 years beginning in October 1981 has reached an estimated cost of approximately Y2 billion.

Ogata's Fine Polymer Project

A fine polymer is plastics provided with functions having high added value. Expectations are placed on developing materials with high intensity and high elasticity, materials with oxygen carrying and supplying functions, various sensors and electrode materials for storage batteries with light weight and low prices. The research period will cover 5 years from October 1981 and the total research cost is estimated at approximately Y1.8 billion.

Nishizawa's Perfect Crystal Project

A perfect crystal means an ideal semiconductor element without turbulence in its atomic arrangement. This is a project involving a combination of perfect crystal production technology and the electrostatic induction theory and thereby pursuing a clue to developing new semiconductor element groups. The project is targeted at realizing ultrahigh speed computers, substantial improvement in power transmission efficiency by furtherance of the DC power transmission, realization of artificial intelligence by its application to the three-dimensional circuit, and applications to optical communication systems and image pickup equipment. The research period will cover 5 years from October 1981 with the total research cost estimated at approximately Y2 billion.

Mizuno's Biolonics Project

This project involves, in short, a study of the autonomy of organisms. It is aimed at developing molecular machines capable of high efficiency motion of less heat loss by direct conversion of energy, new transmission systems with high efficiency for microsignals and medical treatment technology by the accentuation of foreign body discharging function of organisms. Its research period will cover 5 years from October 1982 with the total research cost estimated at approximately Y1.8 billion.

Hayashi's Biological Information Transmission Project

This is a project targeted at pursuing a substance called "prostaglandin" found in the information system of organisms. The project plans to develop narcotics causing natural sleep and memory promoting medicines to reinforce and retain memory. Its research period will cover 5 years from October 1983 with the total research cost estimated at approximately Y1.8 billion.

Horikoshi's Special Environment Microorganism Project

This is a project involving a study of super microorganisms with its research period covering 5 years from October 1984 and the total research cost estimated at approximately Y1.5 billion.

Besides the above, in fiscal 1985 the "Nano Mechanism Project" and the "Solid Surface Project" will be initiated. As has been described thus far, each of the CSTF Projects is a challenge to unexplored science and technology, and thus the trend of enterprises concerned is well worth watching.

Composition of Research Projects for Creative Science and Technology Promotion Program

Project	Subgroup	Corporation of researcher's origin (listed company)
Hayashi's Ultra-particulate Project	Basic property	Chitan Kogyo K.K.
	Physical application	Fuji Photo Film Co., Mitsui Toatsu Chemicals, Inc., Sony Corporation
	Bioscientific application	Maruzen Oil Co.
	Production method	Teisan K.K.
Masumoto's Special Structure Substance Project	Basic property	Sony Corporation, Tohoku Metal Industries, Ltd., Mitsubishi Electric Corporation, Riken Co.
	Noncrystalloid compound material	Nippon Kogaku K.K.
	Noncrystalloid thin film material	
	Special ceramics material	The Furkawa Electric Co., Japan Metal & Chemicals, Co.
	Interlayer compound material	Shimadzu Seisakusho Ltd., Osaka Cement Co.
Ogata's Fine Polymer Project	Molecule design	Sumitomo Chemical Co., (Toray Research Co.)
	Selective functional material	Mitsubishi Chemical Industries, Ltd., Nippon Synthetic Chemical Industry Co., Shiseido Co.
	Organic electronic material	Gosei Gomu Co., Toppan Printing Co., (Matsushita Giken Co.)
Nishizawa's Perfect Crystal Project	Basic structure	Oki Electric Industry Co., Sanyo Electric Co.
	Ultrahigh speed element	Mitsubishi Electric Corporation
	Perfect crystal production method	Mitsubishi Metal Corporation
	Optofunctional element	Hamamatsu Photonics Co., Olympus Optical Co.
Mizuno's Biolonics Project	Basic design	Eisai Co., Kanegafuchi Chemical Industry Co., Konishiroku Photo Industry Co., Terumo Corporation, Kyowa Hakko Kogyo Co., Nippon Gas-Chemical Co., Toyo Jozo Co., Sumitomo Chemical Co.
	Control	
	Composition	Sanyo Electric Co., Hitachi, Ltd.
Hayaishi's Biological Information Transmission Project	Transfer substance	Mitsubishi Petrochemical Co., Kanegafuchi Chemical Industry Co.
	Transfer structure	--
	Transfer movement	Nippon Shinyaku Co., Kyowa Hakko Kogyo Co., Eisai Co.

Source: The "Creative Science and Technology Promotion Program" by the Research Development Corporation of Japan.

Manganese Nodule, Hydrothermal Deposit

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 18-19

[Article: "Gigantic Source of Mineral Resources--Main Project in Development of Marine-Ocean Mineral Resources"]

[Text] Marine Development Facing New Progress

The surface area occupying 70.8 percent of the earth is the sea. Ocean development to use this vast sea is a challenge and often referred to as the last frontier left to mankind. The history of the sea, once filled with dreams and adventures, is now facing a new era.

Feasibility of ocean development is largely divided into two areas: the development of marine resources which includes mineral and marine bioresources and effective use of ocean space. Here, the focus will be narrowed to the development of mineral resources which will have a high industrial application value.

The "Law of the Sea Treaty" voted December 1982 at the Third UN Law of the Sea Conference called world attention to ocean development. According to this new marine order, Japan's economic waters are 4.5 million square km, ranking sixth in the world, an area which is 12 times its land area. Japan being a resource-scarce country surrounded by the sea has high expectations of ocean development.

Japan's ocean development will be marked by cooperation of both the administration and the private sector, centering around the Council for Ocean Science and Technology Development Promotion and the Council for Ocean Development related ministries and agencies. The appropriation for fiscal 1984 related to ocean science technologies amounted to Y60.1 billion, 29 and 25 percent of which are represented by the Science and Technology Agency [STA] and the Ministry of International Trade and Industry (MITI). The appropriation related to STA is centered around the development of a deep-sea submersible research vessel, the Marine Observation Satellite-1, and undersea activity technology. MITI is mainly concerned with the development and research of deep-seabed mineral resources (approximately Y1.1 billion) and a manganese-nodule mining system (Y1.365 billion).

Japan's ocean development focuses on marine mineral resources development, which is considered to be a pillar of future ocean development. In fact, the Agency of Natural Resources and Energy has the following vision of development of marine mineral resources as prospects of marine development in upcoming years: 1980's--establishment of manganese-nodule mining technology; 1990's--establishment of technologies for commercial production of manganese nodule, mining of seabed hydrothermal deposits, and extraction of marine uranium; 2000's--commercial production of seabed hydrothermal deposits and a seawater dissolved resources collection plant. Following is a description of manganese nodules, hydrothermal deposits, and nuclear projects of marine mineral resources development.

Developing Marine Mineral Resources Is the Greatest Attraction

A manganese nodule is a nodule of effective mineral resources centering around manganese. The amount of manganese nodules existing in the Pacific Ocean is as massive as 1.7 trillion tons. Of them, 400 billion tons, about 24 percent, is assumed to be manganese, 16.4 billion tons nickel, 8.8 billion tons copper, and 5.8 billion tons cobalt.

Comparison of existing amounts of individual marine metals with the reserve of their onshore counterparts found that the former-to-latter ratios are 67:1 with manganese, 273:1 with nickel, 21:1 with copper, and surprisingly 967:1 with cobalt. Incidentally, their conversion into the present annual consumption gives 33,000 years' consumption of manganese, about 25,000 years' of nickel, about 1,000 years' of copper, and 21,500 years' of cobalt, thus proving their consumption to be "semipermanent" from the standpoint of human history.

It is regrettable to leave such abundant mineral resources unused in the seabed, and from this point, importance may well be attached to the manganese nodule mining project. Onshore deposits of the above mentioned metals are, in particular, omnipresent in developing countries, and major developed countries are currently urged to develop marine resources as they depend mostly on imports for these metals. In Western countries, since the 1970's, cooperative resources surveys and studies of developmental technology furthered by five groups of international organizations including Japan have been initiated.

In Japan, the Metal Mining Agency of Japan initiated a survey in 1975. In the meantime, the main body of the agency and 48 private corporations have invested to establish Deep Sea Resources Development Co., thereby furthering preparation for commercialization of marine mineral resources. In addition, the Agency of Industrial Science and Technology and MITI initiated the Manganese Nodule Mining System development project at the national level with the aforementioned amount budgeted.

The following companies participate in the project: Ishikawajima-Harima Heavy Industries Co., Ebara Corporation, Kawasaki Heavy Industries, Ltd., Sumitomo Heavy Industries, Ltd., Nippon Kokan K.K., Hitachi Shipbuilding & Engineering Co., Mitsui Shipbuilding & Engineering Co., Mitsubishi Heavy Industries, Ltd., Sumitomo Electric Industries, Ltd., Nippon Electric Co., Meidensha Electric Manufacturing Co., Sumitomo Metal Mining Co., Pacific Metals Co., Nippon Mining Co., Mitsui Mining and Smelting Co., Mitsubishi Metal Corporation, Mitsui O.S.K. Lines, Ltd., and the Metal Mining Agency of Japan.

Thermal Mineral Beds Exist in Waters Surrounding Japan

On the other hand, hydrothermal deposits, another target of marine mineral resources development, are new in the history of development compared with manganese nodules. The first was discovered at a point at latitude 21°N in 1978, followed by another in 1980 and five more in 1981. A hydrothermal deposit is formed when seawater in the earth's crust is brought into contact

with magma to become hot and then recooled. Its main mineral resources are copper, lead, and zinc which are contained in magma plus precious metals of gold and silver. Magma exists at depths of 2,500-3,000 meters, shallower than manganese nodules (5,000 meters).

In Japan, a hydrothermal deposit was discovered off Aomori in 1983, while a large number of counterparts very likely exist in adjacent seas of Japan. Though the development of hydrothermal deposits has not been projected in a clear form at the moment, it has great expectations as a big project around 1990 following manganese nodules. As commercialization of manganese nodules is realized and a hydrothermal deposits development project is initiated in upcoming years, the topic of marine mineral resources development in ocean development will be further highlighted.

Ocean Potential

Item	Content	Status quo
1. Marine organic resources	Annual catch of 200 million tons possible	World catch: approximately 70 million tons/year Japan's catch: approximately 10 million tons/year
	Existing amount of Euphausiacea in the Antarctic Ocean: 1-5 billion tons	Developmental research underway in Japan also
2. Seabed mineral resources	Offshore petroleum: 550 billion barrels (87.4 billion kl)	World offshore petroleum production (1976): 3.4 billion barrels (500 million kl)/year, 16.5 percent of world production
	27.5 percent of 2 trillion barrels (318 billion kl), offshore and onshore ultimate mining reserve	
	Deep seabed manganese nodules:	
	(1) Manganese 400 billion tons (67 times onshore figure)	World consumption (1977) 12 million tons
	(2) Nickel 16 billion tons (273 times onshore figure)	World consumption (1977) 648,000 tons
	(3) Cobalt 5.8 billion tons (967 times onshore figure)	World consumption (1977) 270,000 tons
	(4) Copper 8.8 billion tons (21 times onshore figure)	World consumption (1977) 23,000 tons
3. Marine resources	Uranium dissolved amount: approximately 4 billion tons	World uranium demand (1977) 23,000 tons

[continued]

[continuation of table on Ocean Potential]

Item	Content	Status quo
4. Ocean energy	Wave energy: 13,000 km (14 kw)	Research and development underway in Japan, also
5. Ocean space	Approximately 70 percent of the surface area of the earth is occupied by seas The area of Japan's 200 mile zone: 4.5 million square km (approximately 12 times its land area)	In addition to its use for harbors and waterways from reclamation, uses as ocean recreation, marine stockpile of petroleum, cross-sea bridges, marine airports, etc., are under exploration.

Artificial Island

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 20-21

[Article: "New Kansai Airport To Open in 1992--Construction Expenditures for Initial Period To Be Y1 Trillion"]

[Text] Start of Construction of New Kansai Airport Nears

After World War II construction of artificial islands became active. Advance into the sea continued due to demand for harbors for growing energy and airports or in pursuit of sites for disposal of industrial waste. Their examples after the war are the Mitsui-Miike Artificial Island (Ariake Sea) for development of submarine coal mines, Shin-Oita Airport and Kobe Port Island.

An artificial island has the following merits: compensation for land shortage, disposal of industrial waste, allowing nearby inhabitants to be free from danger and environmental pollution which they would otherwise undergo. Construction of artificial islands is likely to increase in importance in coming years.

The Ministry of Transport has been fostering studies for the use of waters using offshore artificial islands. It conducted case studies in 1984 in four waters such as the offings of Akita Bay and Shimizu Bay. Various projects to bring about these artificial islands will be decided later. Three artificial island projects to construct petroleum stockpile bases have already been decided for Shibushi Bay, Kami-Goto, and Shiroshima.

In this context, construction of Kansai New Airport will reflect the essence of artificial island construction technology so far accumulated, at the same time having great expectations as a model case of artificial islands to be constructed from now on. It is such a big project as to have operating expenses of Y1 trillion thrown in solely for the first-term project. Together with related investment it is likely to result in a great economic effect without fail.

The big project involving "recovering an artificial island 5 km off Senshu, Osaka Prefecture, and constructing a new airport capable of operating around the clock, can be referred to as an attempt to take the initiative in the 21st century. The project is to begin at the end of fiscal 1985 and open at the end of fiscal 1992.

Kansai International Airport Co., the main underwriter of this project, was inaugurated on 1 October last year and has started full-scale activity. Its target is approval of its application for the reclamation of public water surface areas scheduled for July this year. The premise for this is the basic program of the new airport. According to it, the planning of the new airport involves the accomplishment of reclaimed land about 1,200 hectares in area, 5 km off Senshu, and constructing an international airport operating around the clock permitting about 260,000 annual takeoffs and landings.

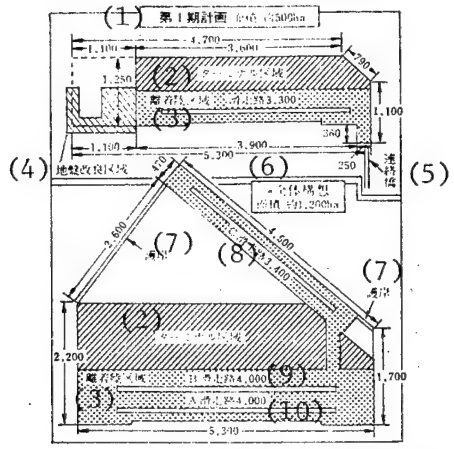
As the first-term program, it is planned to reclaim approximately 500 hectares of land to construct an airport permitting about 100,000 annual takeoffs and landings, targeted at the end of fiscal 1985. The total undertaking expenses for the first-term program is estimated at approximately Y1 trillion, approximately Y82 billion of which is to be taken up by cost for construction. The new company aims at performing operation on a yielding basis, intending to start small and then develop it into a great one, as air demand expands. It plans to expand the airport first constructed gradually to the one designed in the total project, gearing to trends of demand, to make it a state-of-the-art airport in the world.

On the other hand, in order for the new airport to function as an international one it can boast to the world, a peripheral readjustment program is extremely important. In order to support the new airport's function and serve local promotion, Osaka Prefecture has decided to construct its front island, not in the form of an island, but as an offshore-project.

For the first-term project, a draft of the plan for the use of land has been summarized which involves reclamation of the coastline from Izumisano City to Sennan City via Tajiri Town and development of sites involving airport related industries, business, and distribution. These development projects should coincide with the project of the main body of the airport island furthered by Kansai International Airport Co. so that all can be ready for use in 1992.

In this way, the project of the century, the essence of artificial island construction technology, has gone into the final phase.

An analysis of the results of the economic effects construction of the airport has had, has been made public by Osaka Science and Technology Center. The results estimate the investment effects (inducement amount/investment) to be 1.4 times investment with construction of the main body of the airport and 1.7 times that with the related base readjustment; i.e., the inducement amount can be expected of approximately Y1.4 trillion in the former and Y3.4 trillion-Y5.1 trillion in the latter whose scale of investment is estimated at Y2 trillion to Y3 trillion.



(unit: meter)

Key:

1. 1st term project: approximately 500 hectares in area
2. Terminal quarter
3. Takeoff/landing quarter
4. Ground improvement quarter
5. Connecting bridge
6. Entire conception: approximately 1,200 hectares in area
7. Revetment
8. C runway
9. B runway
10. A runway

Outline of Kansai International Airport Project

Location: Offing of Senshu--approximately 5 km off the seashore, approximately 20 meters deep

Entire project:

Area--approximately 1,200 hectares
Main runway--two 4,000-meter runways,
one 3,400-meter runway
Annual takeoff/landing capacity--approximately 260,000
approximately 260,000 frequency
approximately 230,000 passengers
approximately 30,000 by cargo
Number of passengers to be transported:
approximately 68 million/year
Cargo to be transported:
approximately 2.08 million tons/year

1st term project:

Area--approximately 500 hectares
Runway--one 3,300-meter runway (extendable to 4,000 meters in the future)
Construction cost--Y820 billion (cost in FY 83)
(total Y1 trillion)
Airport site reclamation--approximately Y450 billion
Basic facilities construction--approximately Y70 billion
Land connecting facilities--approximately Y120 billion
Functional, convenience facilities--approximately Y180 billion

Airport Project Proposal by Special Corporation

Furthermore, the impact after its opening will be great. The most important is personal exchange (information exchange); however, due to the difficulty of such measurement, analysis has only been made of such areas as airplane passengers, people meeting or seeing passengers off, those visiting on a field trip or traveling on business, airport personnel, consumption of meals on board, the amount of air transport of goods and their productive effects.

Provisional calculations of these effects against a takeoff/landing frequency of 100,000 give approximately Y1.75 trillion in consumption and approximately Y3.84 trillion in productive effects in scale. As related basic readjustment undertakings, a large number of programs and conceptions, besides Osaka Prefecture's front island one, will be implemented such as readjustment of railways and highway networks and redevelopment of land from which earth and sand are obtained for reclamation. Though the details of the project have not been decided yet, construction of the airport will surely bring about large economic effects and a great number of industries are related to it with the construction industry as its pillar. The main part of its construction is land reclamation work, followed by paving work, basic facilities and construction of functional facilities. These, together with a connecting bridge and its peripheral work, will have great impact on industries. Of them, worth watching is ground improvement work whose cost is estimated at over Y1 billion. Those which can be expected are general construction firms such as the Shimizu Construction Co., the Fudo Construction Co., and dredging firms such as Toa Harbor Works Co. and Penta-Ocean Construction Co. With the rubber and belt industries, too, demand of around Y12 billion for conveyor belts for transport of earth and sand can be expected for the first term. Besides these, with the bridge industry, too, great demand can be expected for a connecting bridge and express-highways; thus, much is expected as a project following the bridge formation between Honshu and Shikoku.

Urban Redevelopment

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 22-23

[Article: "Introducing Private-Sector Vitality--Briskness in Effective Use of Government Real Estate"]

[Text] Policy on Land Preference, Easing of Controls

With a call for urban renewal, a trend to promote urban redevelopment is on the rise. Urban redevelopment is one of the main ways to introduce private vitality, which is regarded as an important theme by the Administrative Reform Council. In fact, measures for introducing private vitality such as deregulation, tax reform, and release of the public domain have been implemented in succession; thus demand over the medium- and long-term can be expected for big enterprises such as leading acreage estate and construction companies.

In order to promote urban redevelopment various deregulations are planned, plus a review and reinspection of the City Planning Act and National Land Use Planning Act: 1) ease of volume limitations, expanded preferential treatment

in the appropriation and tax system; 2) promotion of the land trust system as measures for effective use of land; 3) publication of a list of the public domain which can be released for private use; 4) reinspection of the National Land Use Planning Act.

The first move is to ease the volume limitation of buildings based on the Building Standard Law and City Planning Act as, for example, the introduction of a specific square system for easing height limitations in residence areas. Early this year the operating standards of Subsection 1 of Section 86 of the Building Standard Law had been formulated, which is an "exempted system for buildings in a housing development: involving more than one adjacent site to be developed in an integrated manner as in the same site. This will enable back building lots facing narrow streets to be used effectively in the same way as front building lots.

As to the appropriation, "local redevelopment promotion undertakings" and "high-grade redeveloped building readjustment promotion undertakings" will be newly subsidized from 1984 onward.

On the other hand, preferential treatment is to be promoted with the tax system. Besides the extension of the term of the exempted item of Na-1 to expire due to the fiscal 1985's tax reform, three exemptions will be newly improved and established. Above all, worth watching is the establishment of an extra depreciation system for high-grade redeveloped buildings, which involves allowance for 30 percent extra depreciation for the first 5 years to specific high-grade redeveloped buildings to be obtained or newly built. The land trust system is a measure to promote effective land use involving no buying and selling.

Also worth watching is effective utilization of the public domain. Prime Minister Nakasone himself goes so far as to head the "Public Domain Effective Use Promotion Headquarters," studying release of the public domain to the private sector. The lists of the public domain to be released were made public of 12 sites (8.6 hectares) in 23 wards of Tokyo and of 48 sites (14.3 hectares) in major cities around the nation, in December [1984] and February [1985]. In addition, another 4,400 sites (1,000 square meters) throughout the nation are scheduled to be released this summer.

At the same time, the Japanese National Railways will initiate in fiscal 1985 the "New Urban Foothold Readjustment Program," a redevelopment undertaking using its former sites of classification yards and freight stations. For this, it will have Y180 million budgeted for fiscal 1985, thereby implementing undertakings for Minatogawa area (17 hectares), Kobe City, and Hosoe area (20 hectares), Shimonoseki City.

Furthermore, worth watching in fiscal 1985 is a move involving the reform of the National Land Use Planning Act. It imposes, by its Section 23, the duty upon parties to report and have judged their transactions of land of a given scale (more than 2,000 square meters in urbanization areas), which has caused land prices to rise in an area of below 2,000 square meters and subclassification of land. The National Land Agency has begun reinspection of these

matters on the occasion of the 10th year of the enactment of the same Act. Their findings will be made public during fiscal 1985. A series of the aforementioned moves toward the promotion of urban redevelopment are likely to bring about demand in the medium- and long-term for big acreage estate and construction firms.

Needless to say deregulation and preferential measures for the promotion of urban redevelopment will offer changes of more effective operation of undertakings to the industries concerned. Some redevelopment projects worth watching have already begun:

Redevelopment of Former Site of the Shinjuku/Nishi-Toyama Government Employeees Dormitories

This is the first project for use of the public domain. "Shinjuku/Nishi-Toyama Development Co.," the main body of the undertaking, is an association equally capitalized (capitalized at Y2.8 million) by 56 private developers led by Mitsubishi Estate Co. The project involves construction and allocation of high-rise condominiums (570 units) in spaces made available by rebuilding low-rise public employee dormitories (330 units) into high-rise ones. The project is expected to begin in 1985 at the earliest.

Minato Mirai 21 (Future Harbor in the 21st century)

This is a program for redevelopment of Yokohama involving about 186 hectares constructing a new central part of the city facing the sea between Sekiuchi/Isezaki-cho area and the peripheral area of Yokohama Station. Its first-term construction--reclamation and plotting work by the Housing and Urban readjustment Public Corporation--was initiated in November 1983, the third sector of "Yokohama Minato Mirai 21," the main body for the promotion of the project established in July 1984, thus showing steady progress toward its completion in 2000. Twenty hectares of 31 hectares of Mitsubishi Heavy Industries, Ltd.'s former site, the nucleus of the project, has been obtained by Mitsubishi Estate Co., having great expectations as a "second Marunouchi."

Okawabata/Tsukuda-cho Redevelopment

This is the first implementation of the so-called "Okawabata Strategy" to redevelop the total area along the Sumida. The project involves utilizing the "Specific Residential Area Comprehensive Readjustment and Promotion Program" established in fiscal 1979, compound redevelopment of 27 hectares of Tsukuda-cho, Chuo Ward, Tokyo, and construction of superhigh-rise condominiums with 2,500 units. Mitsui Real Estate Development Co. is a private participant in the program.

Redevelopment of the First Area of Osaki Station East Entrance

This is a project involving redevelopment of a 3-hectare area at the east quarter of the Yamate Line, Tokyo, and construction of four buildings, three for business and one for a hotel, to be done by Nippon Seiko K.K., TOC Co., and Tokyo Tatemono Co. Besides the above, a great number of other projects

such as development of the peripheral area of Shibuya Station are on the drawing board.

Main Urban Redevelopment Projects

Title	Main concern	Outline
Minato Mirai 21 (Yokohama)	Yokohama Minato Mirai 21 (capitalized at Y800 million) 25 percent invested by Mitsubishi-group firms	Population planned: Working population--190,000 Residential population--10,000 (3,000 households) Area planned: 186 hectares (87 hectares for building lot)
Okawabata/ Tsukuda area (Tokyo)	Residential Urban Readjustment Public Corporation Bureau of Housing, Metropolis Metropolitan Housing Supply Public Corporation Mitsui Real Estate Development Co.	Number of units planned: Superhigh-rise condominiums (2,500 units, 1,170 units of them to be sold in lots by Mitsui Real Estate Development Co.) Area planned: 27 hectares Buildings planned: three business buildings, one hotel building, and one low-rise building; total construction cost: Y35 billion
First quarter of east side of Osaki Station	Title holder of sites: Nippon Seiko K.K., TOC Co., etc. Joining partners: Token Building Co. (Tokyo Tatemono Co.), etc.	Quarter planned: 3 hectares

Next-Generation Project

Tokyo TOSHI KEIZAI in Japanese Jun 85 pp 24-25

[Article: "The Biggest Project of This Century--New Materials, Biotechnology, and New Functional Elements, Three Mainstays"]

[Text] Huge Project Involving Government, Private Sector, Academia

It was in October 1982 that the "Next-Generation Project," referred to as the greatest in this century, was initiated. Its official title is the "Next-Generation Basic Technologies Development System." The Japanese economy has

grown to such an extent as to shoulder 10 percent of the world's economy, and is being urged to reform its industrial structure to avert future problems such as those experienced in the two oil crises--that is, it needs a "new industrial revolution."

The project is participated in by 67 private enterprises and 12 research organizations, under the guidance of MITI. The project involves establishment of high technologies to construct an industrial base in the next generation of 1990's. Its three pillars are new materials, biotechnology, and new functional elements. It can be regarded as the largest scale national project.

The most impressive feature of the project is that it stresses research and development in cooperation among government, industry, and academia. This reflects the administration's reconsideration of the limitation in its conventional vertical way of conducting studies such as basic studies by the administration and academics and the development of commercialization applied technologies by the private sector. Its primary aim is to substantially shorten the way to establishment of the next-generation industrial base by concentrating the capability of the three areas and thereby furthering research and development (R&D) laterally.

Incidentally, governmental burdens in technological development in major advanced nations all amount to 50 percent, while Japan's accounts for only 30 percent. Furthermore, the rates of governmental investment occupying the total R&D expenditures are 35 percent of the United States, 31 percent of the United Kingdom, 19 percent of West Germany, and 25 percent of France, while that of Japan is only 1.4 percent. Conventional R&D has depended upon private enterprises.

The government came up with this next-generation project, which may be an indispensable project for Japan to advance as a leader of world science, technologies, and economy.

The project should last about 10 years, with a total budget estimated at Y104 billion. Organizations such as the Agency of Industrial Science and Technology and the National Institute of Electronic Engineering are participating in the project. It is divided into three sectors, beginning with 12 themes, and adding 13 themes since fiscal 1985, and another for R&D of "photoreactive materials."

Their research results are to be evaluated every 3 years. A report was already made on the results of the first term in September last year by the Next-Generation Industrial Technology Planning Officer's Office.

Great results have been achieved with 476 patent applications and 688 papers published.

The budget for new materials amounts to approximately Y53 billion, for biotechnology approximately Y26 billion, for new functional elements approximately Y25 billion, and 51 percent of the total budget for new materials.

It is also worth mentioning that implementation bodies of R&D associations have been established by individual themes, helping R&D to operate more efficiently.

New Materials

They are divided into six themes--fine ceramics, high efficiency polymeric defilming materials, conductive polymeric materials, high crystalline polymeric materials, high function crystal control alloys, and composite materials. R&D of new structural or functional materials following metals and synthetic resin, will be fostered thereby creating highly functional ceramics needed in the next generation and polymeric compounds with new functions.

In other words, these themes involve discovery, development of new basic materials, and pursuit of their applicability and establishment of their manufacturing processes. The results of the first term report on fine ceramics at the November [1984] symposium include, for example, synthesis of quality silicon nitride powder, development of high strength silicon nitride, and sintering of silicon nitride by HIP.

The number of participating enterprises totals 51, including, Asahi Glass Co., Kyocera Corporation, Ishikawajima-Harima Heavy Industries Co., Toshiba Corporation, Toyota Motor Co., Asahi Chemical Industry Co., Toray Industries, Inc., Mitsubishi Chemical Industries, Ltd., Teijin Ltd., Hitachi Metals, Ltd., and Mitsubishi Heavy Industries, Ltd. The project features an extremely wide range of participating sectors from those related to ceramics including shipbuilding, automobiles, electric equipment, fiber, chemistry, and nonferrous metals.

Biotechnology

This is divided into three themes of bioreactor, cell mass production, and recombinant DNA (deoxyribose nucleic acid) applied technology. R&D of biotechnology itself has become increasingly active recently. The budgets for the project for fiscal 1984 and 1985 amount to Y1.2 billion and Y1.34 billion, respectively; individual ministries and agencies concerned total 12.3 billion for the former and Y13.4 billion for the latter.

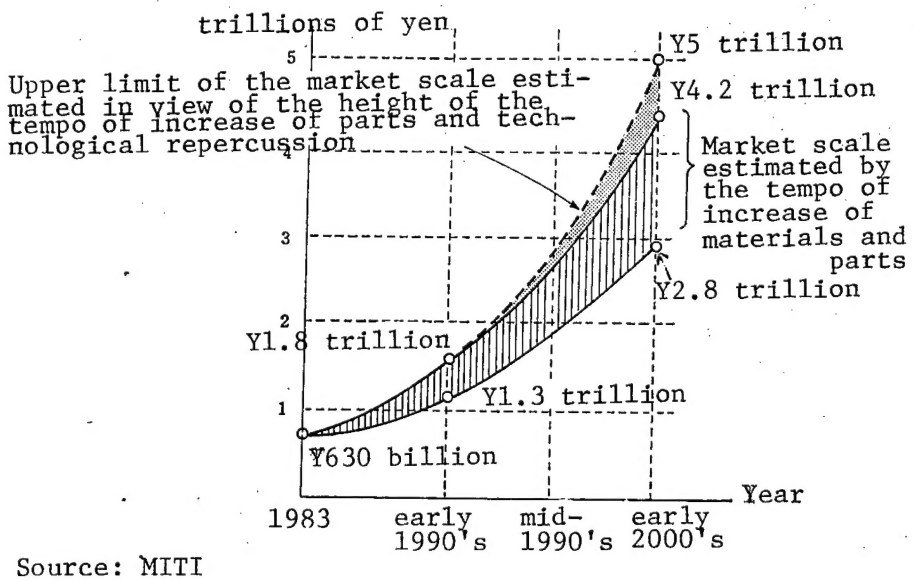
Currently it is the biotechnology sector that is reportedly tackling use of space environment most actively. Since biotechnology represents life science and has high industrial application value of immediate effect, there is great significance in the project. At the November symposium, 24 lectures were given on the matter. The number of participating enterprises totaled 14, including, Mitsubishi Chemical Industries, Ltd., Kao Soap Co., Daicel Ltd., Kyowa Hakko Kogyo Co., Ajinomoto Co., Asahi Chemical Industry Co., Takeda Chemical Industries Co., Toyo Jozo Co., and Sumitomo Chemical Co.

New Functional Elements

This sector is divided into three electronic themes of super-lattice elements, three-dimensional circuit elements, and environmental hazard-resistant

elements. Semiconductors centering around the IC (integrated circuit) are now referred to as "rice for industries." The technological innovation for IC's is advancing at a high rate. When current silicon technology is said to have reached its limitation, it is urgent for R&D to progress to break through the barrier toward the 21st century. Since Japan's semiconductor technology has reached the highest level in the world, the development of future technology based on this performance will have international significance.

The project is participated in by the following leading enterprises: Fujitsu, Ltd., Nippon Electric Co., Hitachi, Ltd., Toshiba Corporation, Mitsubishi Electric Corporation, Oki Electric Industry Co., Sharp Corporation, Matsushita Electric Industrial Co., Sanyo Electric Co., and Sumitomo Electric Industries, Ltd. They will be backed up wholly by the Electrotechnical Laboratory.



Source: MITI

Prospects of Fine Ceramics Market

Sakhalin LNG Development Project

Tokyo TOSHI KEIZAI in Japanese Jun 85 p 26

[Article: "Japan Moves Toward International Bidding--Great Interest by the Trading Companies, Steel, and Engineering Corporations"]

[Text] Equipment Investment To Be Y900 Billion

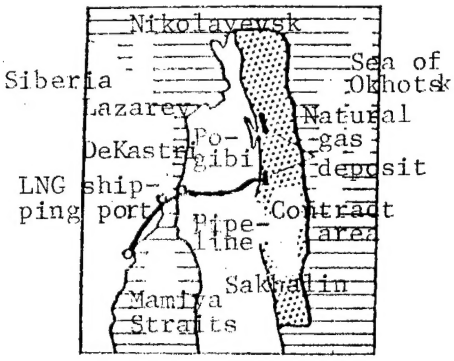
The Sakhalin LNG (liquefied natural gas) Project whose excavation has been delayed under the influence of sanctions against the Soviets by the Reagan administration is likely to advance considerably thanks to detente between

the United States and the Soviets. It is a project tackled in cooperation between Japan and the Soviets, whose liaison company is Sakhalin Oil Development Cooperation Co. (SODECO).

As to LNG projects, there are those, besides Sakhalin, on the west coast of Canada, Alaska, northwest Australia, Thailand, and the Alaska New Project. The Sakhalin Project is a big one in 1990's and equal in scale to the New Alaska Project.

A survey made of mining and development of petroleum and natural gas mine concessions off Sakhalin has confirmed that there exists in Chayvo a mine concession reserves permitting annual shipment of 30 million tons over 20 years. Reserves at Odopt Mine concession have been confirmed also.

The outline of the equipment planning disclosed by SODECO is as follows: 1) Four platforms, derricks for gas production, will be constructed on the natural gas deposit off the northeast part of Sakhalin Island; 2) an approximately 230-km pipeline will be laid across Mamiya Straits and Sakhalin Island to DeKastri Port on the east coast of Siberia.



Sakhalin LNG Development Project

The project is aimed at producing 3 million tons of LNG annually and exporting it to Japan; Japan is investing approximately $3.8 billion (approximately Y900 billion).

The adjacent seas of the Sakhalin Island are under harsh environmental conditions covered with ice for 3 or 4 months, while the Soviets have little experience in full-scale development of marine oil and natural gas. In this context, the Soviets have made clear they will consider international bids for construction of major facilities. Japanese industries, in response to this, have begun to move to receive orders for various facilities concerned.

Japanese trading firms and the iron and steel industry have so far given good presentations during business conferences on petroleum development in the North Sea of Britain and the Arctic Ocean. In addition, Japan's proximity compared with Western nations allows Japanese enterprises an advantage over their Western counterparts.

Substantial acceptance of orders will be made from now on, and Japanese enterprises showing strong interest are the trading firms, C. Itoh & Co. and Marubeni Corporation, SODECO's shareholders, which are likely to display their organizational functions in the project. Also showing strong interest in the project are the iron and steel makers Nippon Steel Corporation and Nippon Kokan K.K., plus general engineering firms of Toyo Engineering Co., Chiyoda Chemical Engineering & Construction Co., and JGG Corporation.

The LNG Project is considered a difficult choice due to changes in energy demand and deterioration in financial conditions; however, the project has already received financing of a little below $200 million from the Export-Import Bank of Japan and it is too late to draw back. As the project progresses, stocks related to Sakhalin are likely to rise.

20117/9365
CSO: 4106/5028

END